

**SAURASHTRA UNIVERSITY , RAJKOT**  
**TEACHING AND EXAMINATION SCHEME FOR**  
**B.E. SEM V ( Electronics & Communication Engg.)**

Code No.	Subject	Teaching		Examination Scheme				
		Lect.	Prac.	Theory	Paper Hrs.	Prac./Oral	Term Work	Total
501	Network Synthesis & analog filters	4	2	100	3	50	25	175
502	Electromangnetics	4	-	100	3	-	-	100
503	Microprocessors	4	4	100	3	50	25	175
504	Communication Engg. – II	4	2	100	3	50	25	175
505	Power Electronics	4	2	100	3	50	25	175
	<b>Total</b>	<b>20</b>	<b>10</b>	<b>500</b>	<b>-</b>	<b>200</b>	<b>100</b>	<b>800</b>

**SAURASHTRA UNIVERSITY, RAJKOT**  
**B.E.SEMESTER-V(E.C.)**  
**(501) SUBJECT: Network Synthesis and Analog filters**

THEORY SCHEME		EXAMINATION SCHEME				
THEORY Hours	PRACTICAL Hours	THEORY Marks	PAPER Hours	PRACTICAL/ORAL Marks	TERMWORK Marks	TOTAL Marks
04	02	100	03	50	25	175

**1. Fundamentals of network synthesis ( Single port networks ):**

Introduction, energy function, Hurvitz polynomials, positive real function, elementary synthesis concepts, Synthesis of L-C, R-L and R-C networks by Foster methods and caner methods.

**2. Synthesis of 2 port networks:**

Network parameters, zeroes of transmission, The coefficient conditions, partial removal of pole, cauer ladder development, LC and RC ladder developments, Darlington's method of synthesis, Residue condition, the transformer, Typical cases of Darlington's synthesis, Guillemin method of synthesis.

**3. Attenuators:**

Symmetrical attenuators, Symmetrical T,  $\Pi$ , Bridged- Tec and Lattice attenuators, Asymmetrical attenuators, Asymmetrical T, L and  $\Pi$  attenuators, balanced and unbalanced attenuators, attenuators for variable load, minimum loss attenuators, Ladder and Variable attenuators.

**4. Equalizers:**

Classification of equalizers, series and shunt equalizers, inverse impedance, inverse network, constant resistance equalizer and its types, Types of simple four terminal equalizers, Full series equalizer and full-shunt equalizer, Bridge-Tec and Lattice equalizers, Characteristics of equalizers, Equalizer for transmission for digital data.

**5. Classical filters :**

Defination and classification, Filter configuration and characteristics, mechanism of filter action, Low pass filter – possible lattice section and Design of prototype sections, High pass filters- Lattice configuration and constant – K prototype section, m- derived T- section, impedance match with m-derived half-section (L-sections) m derived  $\Pi$ - section, Composite filter, Band pass constant 'K' filter, m derived Band pass filter, Band- elimination filter, Modern filter design concept Approximation methods.

**7. Active filters :**

Classification of filters, Magnitude & frequency Scaling.

**8. Biquad circuit :**

Design parameter q and  $\omega_0$ . The biquad circuit frequency, four op-amp biquad circuit, frequency and magnitude response of the biquad circuit.

**9. BUTTERWORTH low pass filter :**

Ideal low pass filters, butterworth response, butterworth pole location, low pass filter specification ,Sallen and key circuit, RC CR transformation.

**10. Butter worth band pass filter :**

A frequency transformation, GEFPE algorithm, Deliyannl's-Friend circuit, Design of bandpass filters.

**11. Chebyshev filters :**

Chebyshev magnitude response, poleslocation and design, comparison between butterworth and chebyshev filters.

**12. Bandelmination filters :**

Frequency transformation, polezero location and filter design.

## **Reference Books :**

- (1) Electrical network - **Rajbhoj S.M. and S. Sathyanarayan** (Technova Pub.)
- (2) Network analysis and Synthesis - **Umesh Sinha** (Satya Prakashan, New Delhi)
- (3) Network, filters and transmission lines - **P.K. Jain, Gurbir Kaur** (TMA.)
- (4) Transmission lines and networks - **Umesh Sinha** (Sathya Prakashan, New -  
Delhi -7<sup>th</sup> Edition, 2001.)
- (5) Fundamentals of electric circuit theory - **D. Chattopadhyay and P.C. Rakshit**  
(S. Chand and company limited, New Delhi.)
- (6) Analog filter design - **M.E. Van Valkenburg** (oxford university press.)

**SAURASHTRA UNIVERSITY, RAJKOT**  
**B.E.SEMESTER-V(E.C.)**  
**(502) SUBJECT: ELECTROMAGNETICS**

THEORY SCHEME		EXAMINATION SCHEME				
THEORY Hours	PRACTICAL Hours	THEORY Marks	PAPER Hours	PRACTICAL/ORAL Marks	TERMWORK Marks	TOTAL Marks
04	---	100	03	-----	-	100

**1. Introduction :**

Electric fields, Electric charge  $Q$  and electric field  $E$ , Electric potential  $V$  and its gradient  $E$ , Multi conductor transmission lines, Line charges.

2. Electric flux and electric flux density, Gauss law, Capacitors and Capacitance, Capacitor cells.

3. Divergence, Poisson's and Laplace's equations

4. Twin-strip and Microstrip transmission lines.

5. Electric currents, Electric current and current density, Resistance and Conductance, Resistivity and Conductivity, Ohm's law, Power and Joule's law.

6. Dielectrics, Conductors and Semi conductors compared – an overview, Conductor cells.

7. Magnetic fields of electric currents, Magnetic flux density  $B$ , Gauss law, Lorentz force or motor equation, Inductance, inductor energy and energy density, inductor cells.

8. Changing magnetic fields, induction and Faraday's law.

9. Maxwells equation in integral form and point form..
10. The uniform plane wave: Wave propogation in free space, Wave propogation in dielectrics, propogation in good conductors, skin effect wave polarisation.
11. Bio electromagnetics: Introduction, The Axon, An active, lossless, shielded Noiseless transmission line, Retival optic fibers, Heart Dipole field, Defibrillators and Pacemakers, Biological Fields, Electromagnetic Hazards and the Environment.
12. **Electromagnetic effects in high speed digital systems:**  
Introduction, two view points, Lumped or Distributed. Distributed Systems Speed and Distance  
**Rise Time and length :** Lumped versus Distributed circuits, Knee frequency, Review of transmission line theory, Reflections in the presence of Capacitance termination. Inductance and Capacitance, How circuit boards are made, Cross talk, Electromagnetic interference.
13. Electromagnetic theory and special relativity.

### **References Books:**

1. Electormagnetics with Application,- **Kraus and Fleisch** (WCB/MGH.)
2. Engineering Electromagnetics - **William B. Hayt and John A. Buck**  
(Tata MGH Com. Lim. Edition 2001.)
3. Electromagnetic waves and radiating Systems - **Edward Jordan and - Keith Balmain** (PHI)

**SAURASHTRA UNIVERSITY, RAJKOT**  
**B.E.SEMESTER-V (E.C.)**  
**(503) SUBJECT: MICROPROCESSORS**

THEORY SCHEME		EXAMINATION SCHEME				
THEORY Hours	PRACTICAL Hours	THEORY Marks	PAPER Hours	PRACTICAL/ORAL Marks	TERMWORK Marks	TOTAL Marks
04	04	100	03	50	25	175

**[A] Architecture & Interfacing :**

**(1). Microprocessor, Microcomputer & Languages :**

Introduction of microprocessor & microcomputer, High level & low level languages, Introduction of large computer, Medium size computer, Microcomputers & different terms related to microprocessor.

**(2). Overview of 8085 - Microprocessor Architecture :**

8085 pin out & internal (functional) block diagram, 8085 pin signals.

**[B] Architecture of 8086 :**

**(1) Architecture :**

Introduction to 16-bit microprocessor, Comparison of 8085 & 8086, Internal block dia. (BIU, EU etc...), GPRS, Index & Pointers etc..., Memory Segmentation concepts & its advantages.

Pinout diagram & its signal details

Clock generator (8284A), 8086 minimum mode module details

Bus controller (8288), Bus arbiter (8289), 8086 Maximum mode module details,

Multiprocessor Bus systems.

**(2) 8086 interrupts & service routines :**

Introduction, 8086 interrupt & actions, working of interrupt, Interrupts & ROM – BIOS service, Hardware or exception interrupts, Software (System calls) interrupt, Interrupt vectors to store Pointers, Interrupt service routines.

**(6) Advanced microprocessors**

Introduction of 80186, 80286, 80386, 80486 & Pentium Processor, RISC, CISC, Real & Protected Virtual mode of each processor.

(7) **Overview of general purpose peripheral chips like 8255,8254,8279.**

[C] **Programming :**

(1) Various addressing modes, overview of various registers & pointers, classification of instructions & its details.

(2) **Assembler directives**

Introduction, classifications & details study of all assembler directives.

(3) **Program development tools & debug commands**

Introduction, details of different program development tools (Text editors, assemblers, Linker, Loader etc ...)

Program development process with flowchart, different debug commands

(4) **Programming using 8086 instructions.**

(5) **DOS interrupts**

DOS system call (INT 21H) and its sub functions

**Reference Books :**

(1) Microprocessor architecture, Programming & its appl. – **R.S. Gaonkar** (PRI)

(2) Microprocessor X86 programming - **K.R. Venugopal** (BPB)

(3) Microcomputer System : The 8086 / 8088 family Archi., program. & design  
- **Liu & Gibson** (PHI)

(4) Microcomputers & microprocessor – **John Uffenbeck** (PHI)

(5) Microprocessor & interfacing - **Douglas V. Hall** (TMH)

(6) Advanced microprocessor & Interfacing - **B. Ram** (TMH)

(7) Intel Micro processor – **Brey** (PHI).

**SAURASHTRA UNIVERSITY, RAJKOT**  
**B.E.SEMESTER- V (E.C.)**  
**(504) SUBJECT: Communication Engineering-II**

THEORY SCHEME		EXAMINATION SCHEME				
THEORY Hours	PRACTICAL Hours	THEORY Marks	PAPER Hours	PRACTICAL/ORAL Marks	TERMWORK Marks	TOTAL Marks
4	2	100	3	50	25	175

1. **Introduction to Digital communication**  
 What is digital communication, Advantages of digital communication, Bandwidth, Bandwidth and channel capacity, Bandwidth and digital computer data.
2. **Multiplexing**  
 Basic and need of multiplexing, types of multiplexing : SDM, TDM, FDM, combined multiplexing system., CDMA.
3. **Sampling and pulse Modulation**  
**Sampling** : Low-pass, Band pass signals, reconstruction, practical difficulties, aliasing, flat-top & Natural sampling, Signal recovery through holding.
2. **Quantization** :  
 Quantization of signal, Quantization error, equation of SNR, Non uniform quantization, companding.
3. **PCM System:**  
 PCM, PCM System, Transmission Band width, SNR, DPCM, DM, ADM, Sigma Delta modulation, Vocoder, Channel Vocoder, LPC, Multiplexing PCM hierarchy.
5. **Pulse Modulation :**  
 PWM, PPM, PAM, PTM, PFM.
7. **Principle of Digital Data transmission :**  
 Block Diagram, Line coding, Pulse shaping, Scrambling, Regenerative repeaters, M-ary Communication, Digital carrier system : Block Schematic & comparative study of ASK, FSK & PSK system, BPSK, QPSK, OQPSK, MSK, GMSK, Digital Multiplexing, Bandwidth compression techniques.
8. **RS-232 Interface standard :**  
 Introduction, RS-232 voltage, Data bits, RS-232 signals, RS-232 examples, RS-232 interconnection: Bits and Band, connectors & pin out, Handshaking,

Limitations, Multi drop communication, other FIA standards Rs-423, RS-422, RS-485.

**9. Digital MODEM :**

Role of modem, Modem functions, operation, originate and answer, connecting modem to the line. Types of MODEM: Bell 103, Bell 212, Bell 202, Ic's for integral modems, multiplexer and concentrator modem.

**10. Test Techniques and Instrumentation :**

Basic tests, Role of the voltmeter and oscilloscope, the Break out Box and line monitors.

**References Books:**

- (1) Modern Digital & Analog Comm. Systems – **B.P.Lathi** (Oxford Uni.Press).
- (2) Principles of Communication Systems – **Taub & Schilling** (MH).
- (3) Communication Systems – **A.B. Carson** (MH).
- (4) Modern radio circuits – **Smith** (MH).
- (5) Communication Satellite – **J. Martin** (PH).
- (6) Communication Systems - **Taub and Schilling** (HH).
- (7) Electronic Communication Systems – **Kennedy** (BH).

# SAURASHTRA UNIVERSITY, RAJKOT

## B.E.SEMESTER-V (E.C.)

### (505) SUBJECT: Power Electronics

THEORY SCHEME		EXAMINATION SCHEME				
THEORY Hours	PRACTICAL Hours	THEORY Marks	PAPER Hours	PRACTICAL/ORAL Marks	TERMWORK Marks	TOTAL Marks
04	02	100	03	50	25	175

#### 1. Introduction.

Emergence of power electronics engineering . PNP devices, Thyristors, Family members & their characteristics. power diodes, Bipolar Power transistor, power MOSFETs, IGBTs. Static induction transistor (SITs). Gate turn-off thyristor, MOS controlled thyristor, Power integrated Ics, Thyristors ratings.

#### 2. Thyristor Turn-on & Turn-off methods.

Thyristor as a controlling device, principle of operation , characteristics and two-transistor analogy of SCR, SCR construction, Gate characteristics, Turn-on methods, Dynamic turn-on, Turn-off mechanism, Ratings, Turn-on and Turn-off losses, Gate trigger circuits, Pulse triggering, Optical isolation. UJT relaxation oscillator. PUT, Diac & Triac, Pedestal & ramp control triggering, Phase triggering and Integral cycle triggering.

#### 3. Series and parallel connected SCRs.

Requirement of series and parallel connections of thyristors, Static and dynamic equalizing networks, triggering methods, derating factor, string efficiency, Precaution to be taken for SCRs in parallel.

**4. Phase Controlled Converter.**

1- $\phi$  HW & FW converters with R and R-L loads. Working of Bridge converter, Symmetrical & Asymmetrical connection. Half-controlled & fully controlled bridge converters. Effect of free-wheeling diode, 3- $\phi$  HW converter with R and R-L, continuous & discontinuous current operation, effect of free wheeling diode, 3- $\phi$  converters, 3- $\phi$  half controlled & fully Controlled bridge converters, Dual converter.

**5. Chopper.**

Chopper principle, duty ratio, chopper control methods, Current limit control, Thyristor turn-off methods, Chopper configurations. Current & Voltage waveform for continuous & discontinuous mode of operation. Step up & Step down choppers, Step up/step down chopper, Class A, Class B, Class C, Class D, Class E chopper, Voltage commutated chopper, Current commutated chopper, Load commutated chopper, Jones chopper, Morgan's chopper.

**6. Inverter.**

Inverter principle, classification of inverter, Series inverter, parallel inverter, Types of inverters, Mc- Murry Bedford inverter, Voltage control of single phase inverter, Voltage source inverter, current source inverter, Cycloconverter principle, 1-  $\phi$  cycloconverter.

**7. AC voltage controllers**

Methods of AC voltage control, single phase AC voltage controllers, Phase control & Burst control methods.

**8. Application**

UPS, Zero voltage firing, Speed control of DC motors, Single phase induction motor using phase control.

## **References Books:-**

- Power Electronics – **M. H. Rashid.** (PHI)
- Industrial Electronics and Control – **Biswanath paul.** (PHI)
- Thyristors and their applications – **M Ram Moorthy** (East West Press).
- Power Electronics : Converters application and Design – **Ved Mohan**  
(Wiley international Edition)
- Power Electronics – **P.C Sen** (Jay Wiley and Sons).
- Power Electronics converter application and design – **Ved Mohan**  
(Wiley International).
- Thyristered power controller – **Dube. Deradla and others.**
- Electronic Drives - **De & Sen.** (PHI).